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ABSTRACT

The aim of this paper is to demonstrate how an evaluation framework was developed and implemented in order to support goals of an e-learning university. The paper discusses the aim of assessment to support institution-wide e-learning goals, the benefits and challenges of this approach to assessing the development of content for e-learning, a description of the evaluation framework and the assessment tool GUIDE (Guided Instructional Design Evaluation), and the results based on implementation for the development of graduate and undergraduate programs. (Author)

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An Evaluation Framework for the Development Process of an Online Curriculum

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Abstract. The aim of this paper is to demonstrate how an evaluation framework was developed and implemented in order to support goals of an e-learning university. The paper will discuss the aim of assessment to support institution-wide e-learning goals, the benefits and challenges of this approach to assessing the development of content for e-learning, a description of the evaluation framework and the assessment tool GUIDE (Guided Instructional Design Evaluation), and the results based on implementation for the development of graduate and undergraduate programs.

ED 479 624

1.0 Introduction

We introduced an evaluation framework to support assessment of the development process for e-learning content. The aims of the framework are: a) implementation guidelines for the development process that based on best practices in pedagogy; b) the strengthening of participants' ability to evaluate their own and others development efforts; c) creation of effective assessment practices; d) dissemination of information including information about our collective development strengths and weaknesses.

The larger aims of the evaluation framework were to emphasize the development of learning and support staff, ensure formative assessment and feedback to continually improve our processes and procedures, and to support an institution-wide mission and goals for learning, resulting in design strategies to accomplish these goals.

2.0 Supporting Institutional Goals

In the case of Technical University of British Columbia (TechBC), the assessment of the development process is strategically shaped by the need to support institutional goals of effective learning, learner-centered learning, and the effective use of technology.

"As an evaluator you assess what is important, thus influencing educational processes and products, and moving these closer to a prescribed level of quality. In any organization, quality is ensured by strategic assessment practices that acknowledge, through the factors that are examined, the mission and goals of the organization." (Orden, 1982:23)

The mission of the academic program can best be described as creating an accessible and effective learning environment. The use of evaluation of the development process strives to achieve and support the mission and goals of the institution within the curriculum and its delivery.

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2.1 Effective Learning

Learning effectiveness is a key composite measurement of institutional, program, and module/course level assessment results. For example, at TechBC, following scalability factors discussed by Tony Bates (Bates, 1995), the development clusters, and the assessment phases of the development were seen to be central supporting tools of assessment in relation to delivery models, and instructional design.

The renewed emphasis of the learning environment and the role of instructional design in e learning require support of assessment methods. The assessment of the development process supports and ultimately validates effective learning activities and delivery environments.

2.2 Learner Centered

Policy directions of the use of evaluation models aimed to re-enforce good assessment practices helped achieve the goal of learner-centeredness as described by Patricia Cross, "...students and their learning should become the focus of everything that we do. From the instruction that we provide, to the intellectual climate that we create, to the policy decisions that we make..." (Cross, 1998).

2.3 Effective Use of Educational Technology

Effective use of the technology in learning is best achieved by ensuring the application of the technology is considered to be interwoven with learning goals, learning and instructional design strategies, resources and logistics. The assessment of the development process and in particular the Quality Circles support this approach and aid in ensuring its successful implementation, becoming a critical component in support of technology and learning goals.

3.0 Benefits & Challenges

3.1 Effective curriculum implementation

In relation to curriculum planning, the goals of TechBC, are to be interdisciplinary in learning strategies and knowledge sharing, and to provide a quality consistent learning environment that nurtures the use of educational technology and is learner centered, regardless of the discipline. Cross-program implementation of the development process supported the curriculum planning goals.

TechBC was faced with a need to look for efficient, scalable methods of developing large numbers of courses – often in new formats and using new technologies – while continuing to meet high pedagogical standards. Some institutions have approaches that are rich in the support and implementation, but too rigid or not applicable in large-scale production (Leacock, et al, 2001).

Scalability in the development process is achievable through the embedding of learning technology. The process of embedding learning technology is not insignificant (Laurillard, et al., 1993). One reason for this is the considerable range of skills that need to be acquired if embedding is to be carried out in a professional way (Phelps et al., 1999).

Early research into the requirements for the design tool showed that there was clear need for support in the process of designing or redesigning courses, in order to take advantage of the opportunities provided by learning technology. For effective use of technology practitioners should be given training, professional development and continuing support.

The reality of having faculty with different skill sets, all knowledgeable in the use of technology, but a wide range of expertise in educational technology, curriculum knowledge, and course development needs to be addressed. Defined development processes, project management and an integrated assessment framework aids substantially in identifying the skill gaps of the people undertaking the task (Conole and Oliver, 1998).

3.2 Effective Management

The delivery of the academic programs aimed to be portable and scalable. Central to the issue of scalability is the need for assessment to support a learning practice that is understood in discrete elements (subject knowledge, pedagogical expertise, multimedia skills, assessment techniques), and understood as a team effort [CVCP, 2000]. At TechBC, inter-disciplinary cluster groups made up of faculty and support

staff in assessment, instructional design, media development, research and project management ensured a high level of quality and effectiveness was achieved in the academic programs.

The assessment structures embedded in the development process support these outcomes and are integral to them. This approach to development allows for greater portability and scalability of the online curriculum.

3.3 Cost-effectiveness

Effective resource management is critical to the successful implementation of online learning. From an academic planning perspective, in order to support successful resource management, the components of intended learning environment must be fully formalized.

If the formative approach to assessment improves the quality of delivery, this ensures less cost at revision time.

4.0 Evaluation of the Development Process

There is literature that reflects on the use and goals of putting together an assessment strategy in the development phases of the project. Most of the time the guiding principle is formative (Calder, 1994); monitoring the development of the product at each phase to ensure quality and achievement of the objectives. In other cases the guiding principle is accountability. Yet, the most common approach is summative, measuring the final product against specific criteria.

Bates (1997) defined the following criteria as determinant factors of quality of an online course: a) content, b) media production, c) instructional design, d) project management, and e) delivery (Bates, 1997).

Most institutions concentrate their assessment efforts on the assessment of the course delivery, using learners' comments as the most common approach for accounting of quality in online courses, and as information required for revisions.

Course delivery has shown to have great dependencies on the quality of the development. The relationship lies in the idea that the quality of the delivery depends on the foundational development work put into the course – the quality of the content itself, the value of the media production selected, and the skill of the content experts as an instructional designer and project manager. In addition to the support of resources and clear processes, quality development relies on an assessment framework to identify gaps and insufficiencies. It is clear in an elearning context, that reliability and quality of the outcome must be assured prior to delivery to learners, and not during.

Specifically, the purpose of assess the course/module development process are:

- To introduce a process for formative review and assessment of the development of the program and the course/modules.
- To implement guidelines for the development process that entrench good pedagogical practices.
- To invoke effective assessment practices.
- To effect management guidelines to ensure quality, fairness and validity, and serve the university's philosophy of innovation.
- To assess effective use of resources and identify skill gaps.

4.1 Stages of the development process:

The development process has five phases: 1) Planning phase, 2) Specification phase, 3) Design phase, 4) Production phase, and 5) Post- production phase.

Each phase has specified deliverables (Belfer and Nesbit, 2001). Institutionally, these phases are coordinated and initiated through an academic workflow process that ensures effective strategic goal setting, design, resource allocation, and implementation of all academic projects.

I. Planning (occurs prior to development cycle)

The purpose of this phase is to plan all or part of an academic program by specifying the program marketing strategy, student characteristics, modules, module objectives, and the pre and co-requisite relations between modules. It also includes creating a plan, assigning roles and responsibilities, such as project manager, membership for the different development clusters, and timelines.

II. Specification (2 weeks)

The outcome of the specification phase is information such as, course name, credit weight, course description, unit names, sequence of units, unit learning objectives, and brief descriptions of learning objects and activities planned for each unit.

The specification phase is very important in the development cycle. During this phase the high level instructional design is specified.

Developers concentrate most of their time doing research to determine the scope of the development, the level of the content, existing textbooks, learning objects, and educational technology options. Upon completion the developers expectations and/or requirements are measured against the existing delivery and evaluations models.

All the specifications are revised by a peer group responsible for contrasting specifications against program goals and system capabilities, and a determination is made at that time on whether the development is to proceed.

III. Design (4 weeks)

The purpose of this phase is to create and publish a prototype of the course in the online learning environment. A unit is regarded as approximately one week of learning time. The prototype includes learning objectives and outlines of web presentations, assessments and learning activities. An instrument called Guide (Guided Instructional Design Evaluation) is used in this phase to assess objectives, delivery model, assessment activities, learning activities, workload, teamwork, learning resources, and the level and quality of the content and web presentation.

IV. Production (8 weeks)

The purpose of this phase is to complete course development by creating learning objects and completing all course authoring and editing tasks. This phase is carried out by the course development team together with educational technology support. GUIDE is used in this phase to assess media elements, and to re-assess learning resources and the level and quality of content.

V. Post-Production (2 weeks)

The purpose of this phase is to ensure the material reads well for the web, outline recommendations for future development of the course, and develop the course delivery plan (e.g. instructors' notes).

4.2 Assessment Process

Table 1 describes the objectives and both formative and summative assessment procedures that would be applied at each stage of the module development process.

4.2 Design Phase: Quality Circles

Quality Circles was one of the most successful parts of the assessment process for meeting its objectives and building on the formative aspect of assessment. Approximately two months into the development cycle. A team that consisted of experts in instructional design, assessment, module content areas, and representatives from the academic planning and academic operations areas (Quality Circle Team) would review a prototype unit.

The Quality Circle team uses Guide to evaluate these prototype units against pre-defined criteria that addressed the learning objectives, assessment strategies, application of delivery models, learning activities, web presentations, interactivity, learner workload, content, balance between team-based and individual work, and match between the resources available for development and the needs of the module. Representatives from the Quality Circle team then meet with the developers to provide feedback.

In many occasions developers commented on the value of the process. Being timely feedback, the opportunity to share ideas, and cluster and interdisciplinary collaboration the key elements that motivated this comments. In a short period of time a great amount of data is gathered, analyzed and synthesize to provide developers with substantial feedback their at a critical juncture in the development process (Leacock, et al, 2001)

Table 1. Module Development Evaluation Process

	a) Planning Phase:	b) Specification Phase:	c) Design Phase: Quality Circles	d.1) Production Phase:	d.2) Production Phase: Editing	e.1) Post-Production Phase: Show & Tell	e.2) Post-Production Phase: Roll up	e.3) Post-Production Phase: Status
Goal:	- Determine the quality and value of the programs. - Ensure consistency across program areas.	- Meets objectives of program design - Resource Planning	- Meets objectives of quality of the Instructional design. - Content expertise - Development performance - Content quality assurance - Instructional design quality assurance	- Content expertise - Development performance - Content quality assurance - Instructional design quality assurance (media production)	- Readability - Consistency	Accountability	Summative report	On-going: Status of the course/ module
Use:	Accountability.	Provide feedback to the course/module developers to improve the course/module development process and the quality of the end product	Provide feedback to the course/module developers to improve the course/module development process and the quality of the end product	Provide feedback to the course/module developers to improve the course/module development process and the quality of the end product	Provide feedback to the course/module developers to improve the quality of the end product	Provide feedback to the course/module developers to improve the quality of the end product	Record	Course production Coordinator
By Whom:	Curriculum Academic and Assessment Planning Group (CAAP)	DAP?	- Instructional design and content: Quality Circle team (Assessment Coordinator, Development Cluster Leader, Instructional Designer, Educational Analyst, Course Development Researcher, Dean of Academic Planning) - Project management. - Content Quality: Cluster Manager	- Instructional design media production: Quality Circle team (Assessment Coordinator, Development Cluster Leader, Instructional Designer, Educational Analyst, Dean of Academic Planning Media Developer) - Project management: Tracey Leacock - Content Quality: Cluster Manager	Online editors	CAAP and peers	Assessment coordinator	ET&L production and delivery team
Role:	Summative	Formative	Formative	Formative	Formative	Summative	Summative	Summative
Milestone Stage:	N/A	Last task of the specification phase, before the design phase starts.	Last task of the design phase, before the production phase starts.	Middle of the production phase.	Middle of the production phase.	End of the production Cycle	End of the development cycle	End of the development cycle
Data Collection:	N/A	Specification document Part I(see Appendix 1). Module names, module objectives, learners workload, teaching and lab resources, etc.	- Complete Specification document. Module names, module objectives, unit names, unit objectives, unit learning activities (assessments, web presentation, in class activities, online activities) learners' workload, teaching and lab resources, etc. - Sample of one unit on the CMS.	Information on the Course Management System (CMS).	Information on the CMS.	Information on the CMS.	- Primary Trait Analysis (PTA's) - Reports form Quality Circles - Report form online editors - Post mortem of development	Editing - Copyrights clearance - Media Production or acquisition - Delivery components

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Elements to be Assessed:	a) Planning Phase:	b) Specification Phase:	c) Design Phase: Quality Circles	d.1) Production Phase:	d.2) Production Phase: Editing	e.1) Post-Production Phase: Show & Tell	e.2) Post-Production Phase: Roll up	e.3) Post-Production Phase: Status
Questions Asked:	- Coherence. - Meeting the academic program objectives	- Course outlines - Learner workload - Lab, teaching and learner resources. - Delivery Model (choice, balance)	- Instructional design (objectives, delivery model, assessment activities, learning activities, learning resources) - Project management: Management of time, human resources, communication, and standards. - Content: Expertise and quality.	-Instructional design (media production, objectives, learning resources) - Project management: Management of time, human resources, communication, standards. -Content: Expertise and quality.	Content	Content and overall structure of the end product.	Overall assessment process. Structure of the development process	Readiness for delivery
		- Are the objectives been met? (Program, content level, integration) - Appropriate choice of, learning resources? - Reasonable workload? - Appropriateness of the delivery model?	- What is working? - What needs to be improved? - How can it be improved?	- What is working? - What needs to be improved? - How can it be improved?	- What is working? - What needs to be improved? - How can it be improved?	- What is working? - What needs to be improved? - How can it be improved?	N/A	N/A
End Product:	Program Plan	- Where needed: List of comments and recommendations for the developers addressing the elements being assessed.	- List of comments and recommendations for the developers addressing all elements being assessed.	- List of comments and recommendations for the developers addressing all elements being assessed.	- List of comments and recommendations for the developers addressing all elements being assessed.	N/A	Final Report	Status Report
Implementation Process:	N/A	- Extraordinary meeting	- The Quality Circles team will use the PTA to asses each course/module. - The learning staff responsible and the cluster manager will (self/peer) Asses the course too. - 1.5hour session with each cluster.	- The Quality Circles team will use the PTA to Asses each course/module. - The learning staff responsible and the cluster manager will (self/peer) Asses the course too. - 1.5hour session with each cluster.	N/A	N/A	N/A	N/A
Instrument for Assessment	N/A	N/A	PTA: GUIDE (Generally Useful Instructional Design Evaluation) - Quality Circles	PTA: GUIDE (Generally Useful Instructional Design Evaluation) - Quality Circles	To be generated	N/A	N/A	

4.3 The Instrument: GUIDE

GUIDE (GUided Instructional Design Evaluation) was created in response to the need for an efficient, reliable and comprehensive instrument capable of supporting the formative assessment of all courses offered (Belfer and Nesbit, 2001).

Drawing from literature on instructional design (Diamond, 1998; Dick & Carey, 1996) a set of rubric-based items applicable to TechBC's modular learning structures and delivery models were created. The development and resulting format of the instrument is similar to the Primary Trait Analysis (PTAs) described by Walvoord and Anderson (1998). PTAs are constructed by identifying components or traits of the products to be assessed then creating a scale for each component and annotating each level of the scale with a descriptive rubric.

Several instructional design components expected to be present in TechBC courses were identified and few items for each component were determined. Table 2 shows the components and the number of items created for each component.

Table 2. Instructional Design Components Assessed by GUIDE.

Component	Number of Items	Component	Number of Items
Learning Objectives	4	Learning Resources	4
Delivery Model	3	Teamwork	4
Assessment Activity	5	Workload	3
Learning Activities	3	Media Elements	9
Content	8	Resources	4
Web Presentation	7	Support for Development	10
Editing	5	**Total**	**68**

For example, the Learning Objectives trait component was broken down into 4 items: Taxonomic Level, Clarity, Fit with Assessments, and Fit with Activities. Table 3 shows the item for Learning Objective Clarity.

Table 3. The Learning Objectives Clarity Item.

Objectives	Strong	Satisfactory	Weak	Absent	Score
Clarity: Objectives are clearly defined.	The objectives are clearly defined.	The objectives are somewhat clearly defined.	The objectives are not clearly defined.	The way the learning objectives are written does not provide information about the expected outcomes. **Or** No learning objectives are specified.	

5.0 Results

The formative assessment structures focused on product and process review, not performance evaluation. By structuring the review to focus on the deliverables, we reduced the anxiety and defensiveness that can be associated with personal evaluations. Instead, the emphasis was on working together to create the best modules possible, and the outcomes have supported this approach.

The most rewarding part of this process was seeing a marked improvement in understanding of instructional design concepts amongst developers over the course of the development cycle. Feedback that showed how these concepts apply to the work each person was doing provided developers with tools for current and future development projects (Leacock, et al, 2001).

The summative assessment structures mainly relay on accountability measures that help keep the developers on schedule with expected milestones and inform the community of the accomplishments obtained.

The development process is based on a cluster approach that enriches the products by providing developers with venues for collaboration and sharing. An emphasis on the development of learning and support staff, formative assessment and constructive feedback enable us to continually improve our processes and procedures to achieve our goals. It has created an institution-wide acceptance of the mission, goals and design strategies required to accomplish these goals.

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